

## RESPONSE TO OFFICE ACTION

### A. Status of the Claims

Claims 1-8 and 16-17 were pending at the time of the Action. Claims 9-15 were withdrawn from consideration. Claims 1-8, 16, and 17 are presented for reconsideration.

### B. Rejection Under 35 U.S.C. §103(a)

Claims 1-8, 16 and 17 remain rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,140,555, issued to Reichert *et al.* (“Reichert”) in view of U.S. Patent 5,477,000, issued to Saxena *et al.* (“Saxena”). Specifically, the Action asserts that Reichert teaches isolating nodal section from corn seedlings and culturing nodal sections on induction media to produce embryogenic callus suitable for transformation. The Action admits that Reichert does not teach germinating mature corn seed in tissue culture media containing an effective amount of auxin and an effective amount of cytokinin to produce a growing seedling containing a nodal section. However, the Action asserts that Saxena teaches germination of mature seed in tissue culture media. Thus, the Action finds it would be *prima facie* obvious to one of skill in the art in the absence of contrary evidence. Applicants respectfully traverse.

The Action asserts that Reichert teaches that immature zygotic embryos can be used as explants for callus cultures, referring to Reichert, column 2, line 59, to column 3, line 5, and also Table 1 of Reichert. The Action also refers to Reichert column 10, line 65, to column 11, line 15, as teaching “[n]odal section explants are placed on corn shoot induction medium” and Reichert column 10, lines 45-47, as stating “explants are also used as targets in a biolistics-based transformation system”. Additionally, the rejection is stated to be repeated for the reasons stated in the previous Action mailed December 27, 2007, which also refers to Reichert column 3, line 60, to column 5, line 3. Applicants respectfully traverse. In particular:

1. Reichert column 2, line 59, to column 3, line 5; and Table 1: immature zygotic embryos and somatic embryogenesis are discussed here, in a literature review, as explants for producing callus cultures. For instance, Reichert states that regeneration was achieved by formation of embryogenic callus from which somatic embryos emerged. The legend of Table 1 characterizes the listed media as being used for “[p]lant regeneration via somatic embryogenesis from the scutellum of immature zygotic embryos.” No explant comprising a **nodal section** is described here, let alone one from a growing seedling, as is required by the present claims which recite, *e.g.*, “...isolating ...and culturing the nodal section...” (present claim 1). Saxena does not cure this defect, as Saxena does not relate to use of a nodal section explant. On the contrary, Saxena explicitly describes their approach as use of “whole, completely **intact** seeds...” (*e.g.* Saxena, column 3, lines 54-59; emphasis added), or “intact plant seed” (*e.g.* abstract, also claim 1, *etc.*). Additionally, Saxena at column 4, lines 57-63, specifically describes their technique as “avoidance of the step in producing the explant material...”, and at column 5, lines 26-27, as “bypassing the conventional step of explant preparation.” Thus, one of skill in the art of plant tissue culture would not apply the teachings of Saxena in a method comprising preparation of explants, such as nodal sections, since Saxena, by teaching use of whole, intact seeds, **teaches away** from the preparation and use of explants, such as the claim limitations reciting “isolating the nodal section from the seedling” (*e.g.* present claim 1).

2. Reichert column 3, line 5, to column 5, line 3: Applicants respectfully note that this portion of Reichert, a literature review, relates to induction of somatic embryogenesis from **immature zygotic embryos** (*e.g.* column 2, line 59, to column 3, line 5, or to use of nodal tissues to initiate **organogenic callus cultures** (*e.g.* Reichert, column 3, line 60, to column 5, line 3). Initiation of **embryogenic** callus from nodal sections is not being discussed. Further, the **organogenic** tissue of column 3, line 60 and following, is stated to be induced here on media that

**do not comprise cytokinin** (*e.g.* column 3, line 65, to column 4, line 2). Further, in Table 1, the **induction media** that are listed do not contain cytokinin, but only auxin. Only some maturation media listed in Table 1 are described as containing a cytokinin (*e.g.* BAP), but the induction and maturation media are distinct media, used in distinct tissue culture steps. Saxena does not cure this defect, since use of only **intact** seeds is taught.

3. Reichert column 10, line 65 to column 11, line 15: Here Reichert is apparently discussing the placement of nodal section explants on a **shoot induction medium**. That is, the medium being used contains BAP (a cytokinin) but **does not contain an auxin**. Only later, during a **subsequent rooting step**, is an auxin (*e.g.* IBA; see column 11, lines 9-11) applied to the already elongating shoots that have been separated and subcultured from the initial shoot clumps. This approach is apparently organogenic, and no step of embryogenic callus induction is described, in spite of the assertion of the Action at page 3, 1<sup>st</sup> full paragraph. Thus, Reichert is apparently mischaracterized in the Action at page 3. Applicants also bring to the attention of the Examiner the discussion in Reichert at column 23, line 25, and following, which further makes clear that nodal section explants are being used by Reichert in an organogenic tissue culture approach. In particular, Reichert states that “...shoots were produced by...proliferation of one (or more) preformed shoot meristem located in the plant, **without callus production**.” (Reichert, column 23, lines 40-42; emphasis added). Thus, Reichert at column 23 differs from their apparent summarization of prior art at column 3, line 60, and following, discussed above, further demonstrating that Reichert is misunderstood in the Action.

Additionally, the Action asserts, at page 4, that the amended limitation “capable of producing callus...” does not overcome the teachings of Saxena, because this term “implies that the claimed nodal section may or may not produce callus.” [Action, page 4, top paragraph]. In response, Applicants respectfully submit that, immediately following the quoted limitation, each

of present claims 1, 16, and 17 explicitly recite that embryogenic callus is produced from a nodal section, according to the claimed method. Thus, the rejection is without basis, and its withdrawal is respectfully requested.

At page 5, last paragraph, the Action asserts that Reichert teaches physiological preparation of nodal explants to induce transformable callus. As noted in part above, Reichert is mischaracterized here, in that column 2, line 59, to column 3, line 5, explicitly discuss use of immature zygotic embryos, rather than nodal explants, to produce callus. Also, as noted above, portions of Reichert that discuss use of nodal explants, such as at column 23, line 40, do not effect formation of callus, instead utilizing an organogenic approach to produce shoots. This aspect of the rejection is thus without basis, and its withdrawal is respectfully requested.

The Action also points to column 5, lines 51-55 as teaching a medium comprising auxin and cytokinin. However Reichert at column 5, lines 44-45, does not state that the tissues being used were nodal explants. Instead they are described as somatic embryos and adventitious shoots from shoot tips, or germinated immature zygotic embryos. Further, Zhong (Zhong *et al.*, *Planta* 187:483-489, 1992; previously cited in an IDS and considered by the Examiner) which is discussed here by Reichert, describes their multiple shoot clumps ("MSC") as being produced without callus formation (Zhong, page 486, left column, and Zhong, page 487, left column, 1<sup>st</sup> full paragraph, last sentence). Therefore Zhong (and Reichert) are discussing an organogenic approach, not an embryogenic approach, clearly distinct from the presently claimed invention. Even in experiments where somatic embryos were eventually formed from shoot tip-derived tissues, callus formation was not seen (Zhong, page 487, right column, and Zhong Figure 8). The present Action, as well as prior Actions, do not address this, and the cited references do not teach a method for using nodal explants to produce callus, let alone embryogenic callus. Further,

Applicants' arguments regarding Saxena are not addressed here in the Action, which only cites Reichert.

One of skill in the art would have held no expectation of success in utilizing the teachings of Reichert and Saxena to arrive at the presently claimed invention. If anything, Saxena teaches away by focusing on use of intact seed, while Reichert does not teach use of nodal explants to form embryogenic callus, which defect Saxena does not cure. In sum, all elements required to establish a *prima facie* case of obviousness of claim 1 are lacking. As such, the rejection is believed mistaken, and withdrawal of the rejection is thus respectfully requested.

**D. Conclusion**

In view of the foregoing, Applicants submit that the claims are allowable and respectfully request that the application be passed to issue.

The Examiner is invited to contact the undersigned attorney at (214) 259-0931 with any questions, comments or suggestions that may expedite the prosecution of the above-referenced patent application.

Respectfully submitted,

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